

Abstract

A semiconductor device is formed including a substrate having an upper surface, a thyristor region in the substrate and a control port adapted for capacitively coupling to at least a portion of the thyristor region via a dielectric material. According to an example embodiment of the present invention, a trench is formed in the substrate and subsequently filled with materials including dielectric material and a control port. The control port is adapted for capacitively coupling to the thyristor via the dielectric material for controlling current flow in the thyristor (*e.g.*, for causing an outflow of minority carriers from a portion of the thyristor for switching the thyristor from conducting state to a blocking state). A portion of the substrate adjacent to the upper surface is implanted with a species of ions, and the dielectric material via which the control port capacitively couples to the thyristor does not include the species of ions. In one implementation, a filled portion of the trench over the control port inhibits ions from implanting the dielectric material. In another implementation, the control port is formed recessed, relative to the upper surface of the substrate, such that the ion implant depth of the region adjacent to the upper surface is shallower than the recessed control port. With this approach, current control in the thyristor is effected using an arrangement that inhibits ion implantation damage to dielectric material used for controlling current in the thyristor.